

for the surgeon to determine whether the patient should be given the protein skin tests.

The seasonal type, either of asthma or hay fever, offers no difficulty in this respect. But it is the perennial type of hay fever and the "sub-hay-fever" groups of Pinness and Miller, which have so often been subjected to unnecessary topical and surgical treatment and many times with no relief to the patient.

It seems a common sense procedure to remove polypi and perform other corrective operations or institute topical treatment which will restore or promote proper drainage even in those cases in which there is a chronic turgescence of the mucous membrane, regardless of which is the primary etiologic factor. But it has been repeatedly shown that these measures alone are generally insufficient, because they must be combined with the therapy instituted by the allergist to correct or relieve the underlying allergic condition to afford the patient the maximum amount of relief.

When the nasal pathology does not in itself seem sufficient to explain the patient's condition, consultation by the surgeon with the allergist is obviously indicated.

The eradication of infective foci in the nose, throat or sinuses with appropriate surgical procedures to promote drainage and secure proper ventilation is indicated whenever these exist, regardless of whether the individual has or has not hay fever or asthma—if only in the hope of improving his general condition.

These procedures are especially indicated in that group of asthmatic bronchitis or bacterial asthma cases where the bacteria-laden secretions are draining into the nasopharynx or throat.

Except for the possible beneficial effect on the patient's general condition, such procedures would seem to be valueless in the treatment of cases of allergic bronchial asthma.

Finally, we must not lose sight of the fact that measures directed toward improving the general condition of the patient are very important.

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HAROLD A. FLETCHER, M. D. (490 Post Street, San Francisco)—In listening to Doctor Hurwitz read his paper before the San Francisco County Medical Society, and later having the pleasure of reading his paper over and taking more time for the details of the subject contained therein, I have been struck with the fairness and broad-mindedness with which he has taken up this subject.

All too many rhinologists fail to look upon the general nature of hay fever and asthma and place too much weight on the local conditions in the nose. It also may be said that a great many physicians, as well as those general physicians interested particularly in allergy, do not credit the local conditions in the nose with the importance they deserve.

There is a middle ground which in the future will become more and more important, which will mean that each individual case will be worked up in a cooperative manner between the rhinologist and the allergist or general physician treating allergic conditions. Without this cooperation, neither one department or the other will become any more successful than has heretofore been the case.

Looking at the subject as a whole, there are always those simple cases which respond to the simple removal of irritating factors locally in the nose. There are also those very difficult cases which, in spite of the most careful reconstructive work in the nose, together with the most careful corrective measures, from the standpoint of general medicine and attempted removal of allergic conditions, so far, have not been benefited.

It is in these latter, more complicated cases that the most careful, conservative work on the part of the rhinologist is necessary. To be able to distinguish between infection in the nasal sinuses due to an allergic condition and infection which is primary and thereby a probable cause of an allergic condition taxes the clinical ability of the rhinologist to the utmost, and decisions must be based on careful observation and careful reasoning.

My own feeling is that the field of hay fever and asthma is a general one and should be in the hands of

general physicians capable of handling the subject of allergy from all standpoints, and that the rôle of the rhinologist should be secondary, ready to aid in the diagnosis and treatment, whether surgical or medical, of any local causative factors.

ADVANTAGES OF ETHYLENE-OXYGEN AS A GENERAL ANESTHETIC*

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THE gas ethylene (C_2H_4) was introduced by Luckhardt and Carter¹ of Chicago and was first used in the Presbyterian Hospital of that city. It is one of the hydrocarbons prepared by passing ethyl alcohol over anhydrous sulphuric or phosphoric acid, thus extracting a molecule of water. It may be considered as an anesthetic occupying an intermediate place between nitrous oxide and ether. It has certain definite and distinctive advantages. It mixes with ether satisfactorily, and by using the ordinary gas inhaler a mixture containing from 1 to 25 per cent of ether vapor may be substituted at any time.

ETHYLENE IN MAJOR AND MINOR SURGERY

Ethylene is successfully used as a general anesthetic in major as well as in minor surgery—tonsillectomies, appendectomies, caesarean sections, hysterectomy, gastroenterostomy, cholecystectomy and other operations; and where the age of the patient has ranged from three days to eighty-four years.

HOW ETHYLENE ACTS

Complete anesthesia may be induced within three to eight minutes. Very seldom is any excitement or sense of suffocation experienced. The relaxation produced is sufficient for all ordinary operations outside the abdomen; but in order to obtain the proper relaxation for intraabdominal operations, especially the upper abdomen, it is often necessary to use in conjunction some ether at the beginning of the operation, also while there is much handling of viscera. In our experience, one ounce of ether is usually quite sufficient for operations lasting from one to two hours; and this does not retard, to any noticeable degree, the return to consciousness of the patient. With alcoholics much more ether is required.

Vomiting usually occurs while the patient is still on the operating table, after the reflexes have returned, aspiration of the vomitus being thus avoided. The patient experiences but little nausea afterward, this depending to a great extent upon the amount of ether used, and upon the anoxemia while anesthetized. We have had acute appendicitis, gall bladder and gastroenterostomy cases where there has been no vomiting during or following the operations.

Luckhardt and Lewis² of Chicago made a careful survey of 119 patients who were given ethylene oxygen, and noted that gas pains were present in 4.2 per cent, whereas 36.6 per cent of those who were operated upon with ether anesthesia suffered from

* Read before the Anesthesiology Section, California Medical Association, at the Fifty-Sixth Annual Session, April 25-28, 1927.

this particular postoperative discomfort. In our experience, the percentage is not as low as this, but we do observe a marked difference in the frequency and degree and duration of the gas pains following the ethylene as compared with ether anesthesia.

Relaxation can be obtained without cyanosis much more readily than when nitrous oxide and oxygen are used. Luckhardt states that the color of the patient is more nearly normal than with any other inhalation anesthetic now in use. Our observation confirms this.

Ethylene is considered less toxic on the nervous system (body cells) in that there are very few headaches from the anesthetic, whereas following nitrous oxide anesthesia the patient frequently complains of throbbing headaches.

After one or two hours of complete anesthesia the patient's garments are dry and rarely need to be changed. Patients are not dehydrated (desiccated) during the operation; and we believe this to be one of the strongest considerations in favor of ethylene. A dry skin (dry clothes) prevent chilling and perhaps is a factor in preventing postoperative lung complications.

NARROW ANESTHETIC MARGIN

The patient passes rapidly from the anesthesia to the waking stage. We cite the following instance where the patient was a poor surgical risk to begin with, where considerable blood was lost on the table, and where the operation performed was one usually attended with considerable shock. The patient awakened immediately, and we were able to administer such stimulants as were necessary for shock, but with the patient conscious. If ether had been used, it would have been necessary to give an unconscious patient stimulants, possibly overstimulating him, because we could not so readily observe the effects. Having the patient awake so soon after the operation is considered by some a disadvantage, but in the case just cited we were glad to have the patient awake immediately, instead of being asleep from one to three hours.

Ethylene is now used in many clinics on all patients with pulmonary tuberculosis, asthma and kindred diseases, who must undergo operation but where it is highly desirable to avoid further lung irritation. There is no increase in the flow of saliva or mucus along the respiratory tract even though the patient has not been given atropine preoperatively.

Donald C. Balfour of the Mayo Clinic, some time ago, during a period of eighteen months, performed more than four hundred stomach operations, using ethylene; and gives this fact as the reason for so few deaths.

RISE IN BLOOD PRESSURE DURING ANESTHESIA

Heaney and Luckhardt^{1,2} of Chicago, Allgeyer³ of New Orleans, and Aurelius of Minneapolis, declare there is very little change in blood pressure. Lundy⁵ of Washington reports four cases of infants where there was increased systolic of 25 mm. mercury; while our series of one hundred cases, where blood pressure was taken at the beginning of the operation and thereafter every five minutes during operation, shows an average increase in systolic pres-

sure of 26 mm. systolic and 14 mm. diastolic. With some patients there was a greater increase than with others, but 26 mm. was the average. The duration of operation on these patients varied from twenty minutes to two and one-half hours. Usually there is a rapid rise within the first ten to twenty minutes, after which time the pressure gradually recedes to normal. In a few instances the pressure was normal for the first half hour; and after that there was a marked increase, the pressure receding to nearly normal later during the operation. In comparing the pressures at the completion of the operation the average case shows no change, while in a few cases it was slightly lower; in others higher.

The question arises, is this an advantage; or is it a disadvantage? Can ethylene be used with safety in hypertension cases? One of our gall bladder patients, a poor surgical risk on account of a cardio-renal complication, with a pressure of 222 systolic and 120 diastolic, presented an interesting variation from the average, in that she began at 222 mm. systolic pressure, rising to 228 after a few minutes, then gradually receding to 120 systolic, 80 diastolic, and remained so until the end of the operation. Other hypertension patients presented practically the same picture.

At first we were somewhat reluctant to administer ethylene to hypertension cases; but an observation made by one investigator, that if digitalis were given to certain hypertension cases it would decrease their pressure, led us to try ethylene in such patients. Our series has not been sufficiently large as yet, to warrant definite conclusions.

To some this increase in blood pressure may seem a disadvantage, due to the fact that it results in increased bleeding during the operation. However, if there is an increase of blood pressure during the operation, all bleeding points are carefully ligated before the abdomen is closed, thereby avoiding postoperative hemorrhage. Whereas, with ether anesthesia, where there is lowering of blood pressure, one might overlook a small bleeding point, so that when pressure returns to normal a postoperative hemorrhage might occur. Is it not better to have an anesthetic which will produce anesthesia, and still be a cardiovascular stimulant rather than one which is a depressant?

HASTENS COAGULATION OF BLOOD

Recent investigation by Straus and Rubin shows that the coagulation time and the bleeding time were markedly decreased during and following the administration of ethylene. This was especially noticeable in jaundice patients.

Leake and Hertzman⁴ of the University of Wisconsin, working along this line, found that there is much less acidosis during an ethylene-oxygen anesthesia than with ether or chloroform. They used the Van Slyke method for this determination. In considering one hundred major operations where ether was used, we found that there was a postoperative acetoneuria in about 85 per cent of the cases; whereas in one hundred major operations where ethylene was used the average was about 70 per cent. Acetone found in the urine, postoperatively, is of very little significance, for patients are usually deprived of

one or two meals before anesthesia and thus might show acetone in the urine without having had an anesthetic.

Infants, as well as patients, who are aged, are usually completely anesthetized, without the additional use of ether or a preliminary opiate.

RESPIRATORY FAILURE BEFORE HEART FAILURE IN LETHAL DOSES

Experiments on dogs show that respiratory failure comes long before cardiac failure; and the dogs always responded to artificial respiration after a lethal dose.

TWO DISADVANTAGES OF ETHYLENE

1. Odor. 2. Danger of explosion. The odor is complained of when the gas is first introduced into the operating room; but after its continued use it is scarcely noticeable, except to newcomers or visitors.

Ethylene is inflammable, and with certain mixtures of air and oxygen is highly explosive. Experiments worked out by Brown⁶ of Toronto show that ether vapor is more highly explosive than ethylene gas. The thermocautery should never be used on a patient to whom ethylene is being administered; neither should ethylene be given in the x-ray room nor where high frequency is used as a cautery. Luckhardt says that, contrary to the common belief, nitrous oxide will ignite with an ensuing explosion, but not nearly as readily as ethylene gas or ether vapor.

A while back a doctor in Kansas, while cauterizing an urethral caruncle with a high frequency machine, experienced an explosion with nitrous oxide oxygen. A Hydebrink gas apparatus was the one used, and there was no ether in the vicinity; yet the patient was badly burned and received a court judgment of six thousand dollars.

Heaney reported two explosions with ethylene in obstetrical work, which he attributed to static sparks. They occurred in the same delivery room, the same anesthetist using a McKesson gas machine on both occasions. There was no free flame present on either occasion; no one was badly hurt. He also reported an explosion about a year ago, while using nitrous oxide and oxygen in the same delivery room, under similar circumstances. He stated further that a certain manufacturer of gas machines informed him that there are about 100 explosions per year from one cause or another while using ether in conjunction with nitrous oxide oxygen. Luckhardt, of Chicago, states that explosions from static sparks are easily overcome by grounding the gas machine and running a wire through the rubber tubing from the gas machine to patient.

CONCLUSIONS

While the use of ethylene is of quite recent origin in the field of inhalation anesthesia, we have endeavored to give it a fair consideration and are well pleased with the results obtained. However, at present we add 1 to 5 per cent carbon dioxide as a respiratory stimulant, whereby we believe we obtain better relaxation, and in most cases are enabled to eliminate the use of ether entirely. Our reason for

adding carbon dioxide is that surgeons generally insist upon giving morphin preoperatively, which is a respiratory depressant. In many cases the respiratory center is so depressed that the patient does not breathe sufficiently well to aereate the lungs with ethylene, and as a consequence proper relaxation is not obtained. With the mixture just indicated this is overcome, and we believe it will add to the efficiency of this comparatively new anesthetic.

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REFERENCES

1. Luckhardt and Carter: Ethylene as a Gas Anesthetic, J. A. M. A., lxxx, p. 1440, March, 1923.
2. Luckhardt, A. B., and Lewis, Dean: Clinical Experiences with Ethylene-Oxygen Anesthesia, J. A. M. A., 81, 1851, December 1, 1923.
3. Allgeyer: Report on One Hundred Anesthetics Administered with Ethylene Gas, New Orleans M. and S. J., pp. 383-387, February, 1924.
4. Leake and Hertzman: Blood Reactions in Ethylene and Nitrous Oxid-Oxygen Anesthesias, J. A. M. A., 82, p. 1162, April, 1924.
5. Lundy: Ethylene, Its Value in Relation to Other Anesthetic Agents, Northwest Medicine, 1924.
6. Brown: Preliminary Report, Experiments with Ethylene as a General Anesthetic, Canadian Medical Association's Journal, Vol. xiii, No. 3, p. 210, March, 1923.

Anti-syphilitic Treatment of Pregnant Women—One of the many important things that Doctor Hopkins brought out, and it needs to be emphasized and repeated again and again, is the enormous benefits that have come from prenatal treatments of the syphilitic mother. . . . That is the first point that Doctor Hopkins emphasized, and I want to say it again in expressing the thought that a thing has to be said again and again in order that it may sink in. I find that true in my own case. I hear things many times and say to myself, "Well, I heard that a year ago." But it did not impress me profoundly. It simply caromed off the mind, so to speak, and I did not get it. But this is a thing worth remembering. We are getting from clinics all over the country corroboration of the fact that the syphilitic pregnant woman is peculiarly responsive to medical treatment. In no better way can the possible blindness of the child be more effectively warded off.—Park Lewis, proceedings of the Twelfth Annual Conference of the National Committee for the Prevention of Blindness.

What Is a Charitable Institution?—A point that has aroused a question in the minds of some legal jurisdictions is whether or not the charging of fees to private patients affects adversely the legal status of a charitable hospital, and in this connection the following decisions selected from Lapp and Ketacham on Hospital Law are offered:

"That fees are charged by a university or hospital is not controlling as to its being a charity, for only when such income is devoted to the profit of the founders and not used to carry on the work by adding to the endowment, etc., does it show the institution is a business and not a charity." (1916 *Butterworth vs. Keeler*, 219 N. Y. 444, 114 N. E., 803 offg. Judgment, 154 N. Y. S. 744, 169, App. Div. 136.)

"What controls is not the receipt of income but its purpose. Income added to the endowment helps to make it possible for the work to go on. It is only when income may be applied to the profit of the founders that business has a beginning and charity an end. The line of division is the same whether the gift is devoted to education or to the relief of the poor, the halt and the blind."

"When the bequest is to an association whose beneficence is restricted to its members only, it is not a public charity." (Bobb vs. Reed, 5 Rawle (Penn.) 151, 28 Am. Dec. 650.)

"But, if extended to non-members, may be counted as public charity." (1848, *Pickering vs. Shotwell*, 10 Pa. 23.) —Bulletin A. M. A., April, 1927—Atlantic Medical Journal.